

**Listing of Claims:**

1. (Currently Amended) An ink jet recording apparatus comprising:

an ink jet recording head which includes a plurality of nozzles divided into a plurality of groups and ~~ejects an~~ which is adapted to eject ink from ~~a~~ the plurality of ~~the~~ nozzles;

a carriage on which ~~has~~ the ink jet recording head is mounted, ~~thereon~~ and which is driven to reciprocate in a direction orthogonal to a transferring direction of a recording medium;

a sensor which is provided in a drive range of the carriage and ~~provided in such a manner~~ that an optical axis of detection light ~~thereof~~ of the sensor is inclined with respect to a moving direction of the carriage, and said sensor optically ~~detects~~ detecting the ink ejected from each of ~~a~~ the plurality of ~~the~~ nozzles ~~in the ink jet recording head~~; and

a controller which controls an ejection operation of the ink ~~of the ink~~ jet recording head, inspects an ejection state of the ink from ~~a~~ the plurality of ~~the~~ nozzles based on an output ~~result~~ from of the sensor, and shifts ~~an~~ ink ejection ~~timing every group~~ timings of the plurality of groups with respect to each other when inspecting the ink ejection state ~~of the ink jet recording head~~, wherein a shifting time of the shift ink injection timings

of the plurality of groups is being shorter than ~~an one~~ ejection cycle in each of the plurality of groups in image recording.

2. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the controller sequentially changes the nozzles to which eject the ink ~~every group~~ in each of the plurality of groups.

3. (Currently Amended) The ink jet recording apparatus according to claim 2, wherein the controller causes one nozzle to ~~continuously eject a plurality of inks~~ the ink a plurality of times.

4. (Currently Amended) The ink jet recording apparatus according to claim 3, wherein the controller ~~makes~~ sets an ink ejection mode of a reference nozzle to be different from ~~that an~~ ink ejection mode of any all other nozzle nozzles.

5. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the controller ~~makes~~ sets ink ejection cycles in to be the same for each of the respective plurality of groups ~~equal to each other~~ when inspecting ~~an the~~ ink ejection state.

6. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the controller ~~makes~~ sets ink ejection cycles ~~in of the respective plurality of groups equal to~~ ink ejection cycles be the same in image recording in case of and when inspecting ~~an~~ the ink ejection state.

7. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the controller controls ~~an~~ the ink ejection timing of each ~~group in of the plurality of groups~~ such ~~a manner~~ that ejection of the ink from a first group ~~in a plurality of the groups~~ and ejection of the ink from a second group ~~in a plurality of the groups~~ are alternately carried out.

8. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the controller controls the ink ejection ~~timing in~~ timings such ~~a manner~~ that the ink is ejected from a nozzle in ~~any other group in an~~ each of the plurality of groups within one ink ejection cycle ~~in of the first group after the ink is ejected from the first group in a plurality of the groups.~~

9. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein, assuming that ~~the number a~~ quantity of the groups is X and the ink ejection cycle is T

seconds, the controller controls the ink ejection ~~timing in~~  
5 timings such ~~a manner~~ that the ink ejection cycle of each of the  
plurality of groups is shifted from an ejection cycle of a group  
which has precedently ejected the ink by T/X seconds.

10. (Currently Amended) The ink jet recording apparatus  
according to claim 1, wherein the controller sets the shifting  
time Tz as follows:

$$T_t < T_z < T - T_t$$

5 where:

Tt [[:]] is the time required for the ink to pass  
through the detection light; and  
T [[:]] is the ink ejection cycle.

11. (Currently Amended) The ink jet recording apparatus  
according to claim 1, wherein a moving speed of the carriage when  
inspecting the ink ejection state is set to be equal to a moving  
speed in image recording.

12. (Currently Amended) The ink jet recording apparatus  
according to claim 11, wherein the drive range of the carriage  
~~has~~ includes a constant speed drive area in which the carriage is  
driven at a constant speed and ~~an inversion~~ a reversing drive

5 area in which the carriage is driven to be ~~inverted~~ reversed, and the sensor is provided in the fixed speed drive area.

13. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the ~~sensor is provided in such a manner that the optical axis of the detection light thereof is inclined with respect to a~~ the drive direction of the carriage ~~at~~ by 45 degrees.

14. (Currently Amended) The ink jet recording apparatus according to claim 1, wherein the sensor detects the ink ejection state in a detection timing ~~according to~~ based on the ink ejection timing of each of the plurality of groups.

15. (Currently Amended) An ink jet recording apparatus comprising:

a plurality of ink jet recording heads each of which includes a substantially linear nozzle column ~~consisting of~~  
5 including a plurality of nozzles;

a carriage on which ~~has a~~ the plurality of ~~the~~ ink jet recording heads are mounted ~~thereon in such a manner that each of~~  
a the plurality of ~~the~~ ink jet recording heads ~~is~~ are arranged along a direction orthogonal to a recording medium transferring  
10 direction and such that the nozzle columns thereof are arranged

along the recording medium transferring direction, and ~~which is driven in a~~ drive direction of the carriage being orthogonal to the recording medium transferring direction;

15 a sensor which is provided in a drive range of the carriage ~~and provided in such a manner~~ that an angle of detection light ~~thereof~~ of the sensor is inclined at an angle so as to cross ~~a~~ the plurality of the nozzle columns when the nozzle columns move past the sensor, and which optically detects ~~an~~ ink ejected from ~~a~~ the plurality of the nozzle columns; and

20 a controller which controls an ink ejection operation of ~~a~~ the plurality of the ink jet recording heads, inspects an ejection state of the ink ~~from a plurality of the nozzles~~ based on an output ~~result from~~ of the sensor, and shifts ~~an~~ ink ejection ~~timing every plural~~ timings of the plurality of nozzle columns with respect to each other when inspecting the ink  
25 ejection state, wherein a shifting time of the shift ink ejection timings of the plurality of nozzle columns is being shorter than ~~an~~ one ejection cycle in each of the nozzle columns in image recording ~~of each of the nozzle columns~~.

16. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the ~~ink ejection~~ controller sequentially changes the nozzles to which eject the ink ~~every nozzle column~~ in each of the plurality of nozzle columns.

17. (Currently Amended) The ink jet recording apparatus according to claim 16, wherein the controller causes one nozzle to ~~continuously eject a plurality of inks~~ the ink a plurality of times.

18. (Currently Amended) The ink jet recording apparatus according to claim 17, wherein the ~~ink ejection~~ controller sets ~~makes~~ an ink ejection mode of a reference nozzle to be different from ~~that~~ an ink ejection mode of ~~any all~~ other ~~nozzle every~~ nozzles in the nozzle column.

19. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the controller ~~makes~~ sets ink ejection cycles ~~in~~ to be the same for each of the ~~respective plurality of~~ nozzle columns ~~equal to each other~~ when inspecting the ink ejection state.

20. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the controller ~~makes~~ sets ink ejection cycles ~~in~~ of the ~~respective plurality of~~ nozzle columns ~~equal to ink ejection cycles~~ be the same in image recording ~~in case of~~ and when inspecting ~~an~~ the ink ejection state.

21. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the controller controls ~~an~~ the ink ejection timing of each of the plurality of nozzle columns ~~in~~ such ~~a manner~~ that an ink ejection operation from a nozzle of a first nozzle column ~~in a plurality of the nozzle columns~~ and an ink ejection operation from a nozzle of a second nozzle column ~~arranged so as to be adjacent to the first nozzle column~~ are alternately carried out.

22. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the controller controls the ink ejection ~~timing in~~ timings such ~~a manner~~ that the ink is ejected from the nozzle of the second nozzle column ~~arranged so as to be adjacent to the first nozzle column in the~~ within one ink ejection cycle of the first nozzle column after the ink is ejected from the first nozzle column ~~in a plurality of the nozzle columns~~.

23. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein, assuming that ~~the number~~ a quantity of the nozzle columns is X and the ink ejection cycle is T seconds, the controller controls the ink ejection ~~timing in~~ timings such ~~a manner~~ that the ink ejection cycle of each of the plurality of nozzle columns is shifted from an ejection cycle of



a nozzle column which has precedently ejected the ink by T/X seconds.

24. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the controller sets the shifting time  $T_z$  as follows:

$$T_t < T_z < T - T_t$$

5     where:

$T_t$  [[:]] is the time required for the ink to pass through the detection light.

$T$  [[:]] is the ink ejection cycle.

25. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein a moving speed of the carriage when inspecting the ink ejection state is set to be equal to a moving speed in image recording.

26. (Currently Amended) The ink jet recording apparatus according to claim 25, wherein the drive range of the carriage ~~has~~ includes a constant speed drive area in which the carriage is driven at a constant speed and ~~an inversion~~ a reversing drive area in which the carriage is operated to be ~~inverted~~ reversed, and the sensor is provided in the constant speed drive area.

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27. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the ~~sensor is provided in such a manner that the optical axis of the~~ detection light ~~thereof~~ is inclined with respect to a drive direction of the carriage ~~at~~ by 45 degrees.

28. (Currently Amended) The ink jet recording apparatus according to claim 15, wherein the sensor detects the ink ejection state in a detection timing ~~corresponding to~~ based on the ink ejection timing of each of the plurality of nozzle columns ~~nozzles~~.

29. (Currently Amended) An ink jet recording apparatus comprising:

an ink jet recording head having a substantially linear nozzle column ~~consisting of~~ including a plurality of nozzles  
5 divided into a plurality of groups;

a sensor which is provided ~~in such a manner~~ that detection light thereof is inclined at an angle so as to cross the nozzle column, and which detects passage of ~~an~~ ink when ~~the~~ ink ejected from each ~~nozzle in the nozzle arrangement comes across of the~~  
10 plurality of nozzles crosses the detection light; and

a controller which controls an ink ejection operation of the ink jet recording head, relatively moves the ink jet recording

head and the sensor, inspects an ink ejection state ~~by causing of~~  
the ink ~~ejected from all of the~~ plurality of nozzles constituting  
15 of the nozzle column to pass through the detection light based on  
an output of the sensor, and shifts ~~an~~ ink ejection ~~timing every~~  
~~group~~ timings of the plurality of groups with respect to each  
other when inspecting the ink ejection state, wherein a shifting  
time of the ~~shift~~ ink injection timings of the plurality of  
20 groups is being shorter than ~~an~~ one ejection cycle ~~in image~~  
~~recording of~~ of each of the groups in image recording.

30. (Currently Amended) The ink jet recording apparatus  
according to claim 29, wherein the ~~ink ejection~~ controller  
sequentially changes a nozzle ~~to eject~~ which ejects the ink ~~every~~  
~~group~~ in each of the plurality of groups.

31. (Currently Amended) The ink jet recording apparatus  
according to claim 30, wherein the controller causes one nozzle  
to ~~continuously~~ eject ~~a plurality of inks~~ the ink a plurality of  
times.

32. (Currently Amended) The ink jet recording apparatus  
according to claim 31, wherein the ~~ink ejection~~ controller ~~makes~~  
sets an ink ejection mode of a reference nozzle of each of the

plurality of groups to be different from an ink ejection mode of  
~~any~~ all other ~~nozzle every nozzle~~ nozzles in the group.

33. (Currently Amended) The ink jet recording apparatus according to claim 29, wherein the controller ~~makes~~ sets ink ejection cycles ~~in~~ to be the same for each of the ~~respective~~ plurality of groups ~~equal to each other~~ when inspecting the ink ejection state.

34. (Currently Amended) The ink jet recording apparatus according to claim 29, wherein the controller ~~makes~~ sets the ink ejection cycles ~~in~~ of each of the plurality of groups ~~equal to~~ ink ejection cycles be the same in image recording ~~in case of~~ and when inspecting the ink ejection state.

35. (Currently Amended) The ink jet recording apparatus according to claim 29, wherein, assuming that ~~the number a~~ a quantity of the groups is X and the ink ejection cycle is T seconds, the controller controls ~~an~~ the ink ejection ~~timing in~~ timings such ~~a manner~~ that the ink ejection cycle of each of the plurality of groups is shifted from an ejection cycle of a group which has precedently ejected the ink by T/X seconds.

36. (Currently Amended) The ink jet recording apparatus according to claim 29, wherein the controller sets the shifting time  $T_z$  as follows:

$$T_t < T_z < T - T_t$$

5      where:

$T_t$  [[:]] is the time required for the ink to pass through the detection light,

$T$  [[:]] is the ink ejection cycle.

37. (Currently Amended) The ink jet recording apparatus according to claim 29, wherein the ~~sensor is provided in such a manner that the optical axis of the detection light thereof is~~ inclined with respect to a drive direction of the carriage ~~at~~ by 45 degrees.

38. (Currently Amended) The ink jet recording apparatus according to claim 29, wherein the sensor detects the ink ejection state in a detection timing ~~according to~~ based on the ink ejection timing of each of the plurality of groups.